RESEARCH NOTE

Innovative Advisory through CROPSAP

M.C. Ahire[1] and P. B. Kharde[2]

1. Prof. (Agril. Ext.), 2. Asso. Prof., (Agril. Ext.), Directorate of Extension Education, MPKV, Rahuri, Dist. Ahmednagar (MS)

Corresponding author e-mail: milindahire1@rediffmail.com,

ABSTRACT

The lepidopteron pests especially Helicoverpa armigera and Spodoptera litura are voracious feeders and polyphagous in nature. In year 2008-09, soybean had a setback to epidemic attack of Spodoptera litura and other pests on 15.00 lakh ha. area. Keeping this in consideration, a project on "Crop Pest Surveillance and Advisory Project (CROPSAP) of major pests in Soybean, Cotton, Tur and Gram based cropping system in Maharashtra" has been approved by the State Govt. under Rashtriya Krishi Vikas Yojana (RKVY) in 2008-09 with total outlay of Rs. 25.00 crore. This includes Rs. 12.79 crore for pest Surveillance and 12.21 crore for IPM. Under this project pest monitoring cum surveillance based advisory system and awareness creation through consortium mode has focused on the pest control of major crops. Advisories on Integrated Pest Management in accordance to the pest status based on pest monitoring.The study implies strengthening of information delivery mechanism for efficient agricultural knowledge management system. New methods and approaches for communication especially for delivery of advisory services are very essential. The study underlines the application of innovative online surveillance for control of pest incidence. Similar method need to be replicated for other crops in different regions.

Key words : *Lepidopteron pests; Voracious feeders; Advisory services; Innovative online surveillance;*

The conventional agricultural knowledge system is undergoing rapid changes. Efficiency of knowledge dissemination is essential for strengthening our agricultural research and extension systems. Crop advisory is a vital component for sharing knowledge and has benefitted the farmers. Application of innovative methods in crop advisory can bring the desired results as evidence from the present study. The lepidopteron pests especially *Helicoverpa armigera* and *Spodoptera litura* are voracious feeders and polyphagous in nature. The epidemic appearance and vast devastation of crops are common features in many cropping systems. In cotton the cyclic epidemics of these pests are regular phenomena. In Maharashtra the epidemic appearance of the two pests on cotton during late 90's caused severe yield losses.

The area under soybean crop has increased phenomenally in Vidharbha region in the last two years due to near good average yield per ha. and fetching of good market prices. The pest also shifted accordingly and epidemic scenario of *S. litura* coupled with *H. armigera* and other leaf eating caterpillars in soybean in Maharashtra especially in Vidarbha region was noticed during 2008-09. This had caused severe yield losses in soybean in a major area in Maharashtra and around 7.5lakh ha area in Vidarbha alone. Establishment of an intensive pest monitoring mechanism and advisory / awareness system, if put in place, would help in overcoming such an epidemic situations.

In Maharashtra state soybean, cotton, tur and gram crops are normally grown on 137 lakh ha. area. During last few years due to good yield per ha. and fetching good market prices, the area under soybean is increased from 14.38 lakh ha., normal area to 31.78 lakh ha. in year 2010-11. The total area of soybean and cotton in kharif is about 62 lakh ha and also total area of Tur and Gram in rabi is 62 lakh which contributes 40-45% of the kharif and rabi season, respectively. The economy of most of the farmers, especially of Vidarbha and Marathwada region depends upon these crops. Since last few years due to adverse climatic conditions, global warming, irregularities in rainfall coupled with pest and disease attack caused heavy loss in crop production of all these four crops.

In year 2008-09, soybean had a setback to epidemic attack of *Spodoptera litura* and other pests on 15.00 lakh ha. area. Considering the loss in production to the farmers, Maharashtra Government has provided Rs. 450.00 crore financial aid to soybean growers. An event warrants a strong agriculture supervisor and advisory mechanism in place. To cater this requirement, a series of meetings were held with different partners to develop an appropriate programme. As a remedy to combat the grave situation, State Government submitted a proposal to Central Government for financial aid. Central Government suggested the state Govt. to undertake pest surveillance programme and create awareness among farmers for Integrated Pest Management (IPM) in soybean, cotton, tur and gram. Also GOI directed to submit a proposal under Rashtriya Krishi Vikas Yojna (RKVY) for financial requirements.

Keeping this in consideration, a project on "*Crop Pest Surveillance and Advisory Project (CROPSAP) of major pests in Soybean, Cotton, Tur and Gram based cropping system in Maharashtra"* has been approved by the State Govt. under Rashtriya Krishi Vikas Yojna (RKVY) in 2008-09 with total outlay of Rs. 25.00 crore. This includes Rs. 12.79 crore for pest Surveillance and 12.21 crore for IPM.

The major objectives of this project are to create awareness among the farmers in Integrated Crop Management practices including IPM in soybean-cotton based cropping system, to develop On-Line Monitoring System for major pests in soybean &cotton throughout Maharashtra, to identify the hotspots with special reference to *Spodoptera litura*, to issue advisory in accordance to the pest status based on the pest monitoring, to guide the farmers based on the advisories for management of major pests in Soybean and Cotton.

The progarmme was implemented in consortium mode where State Agriculture Department, Maharashtra, National Centre for Integrated Pest Management (NCIPM), New Delhi, Dr.Panjabrao Deshmukh Krishi Vidyapeeth (PDKV), Akola, Marathwada Agricultural University (MAU),Parbhani, Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri,Central Institute for Cotton Research (CICR), Nagpur, Directorate of Soybean Research (DOSR), Indore, Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad are the consortium partners in this joint venture.

Mode of Operation: The programme consists of two parts i.e., pest monitoring-cum-surveillance based advisory system and awareness creation. At the state level the steering committee has been formed with the members from different organizations and responsibilities to coordinate the overall programme through monthly meetings, to assign the work to different stakeholders of the programme and to supervise its' proper implementation. State Level Steering Committee has been formulated under the chairmanship of Commissioner, Agriculture which comprises one representative from all aforesaid stakeholders.

Hierarchical structure: For Pest Monitoring, a Sub divisional Agriculture Officer from State department of Agriculture is working as Coordinator to facilitate between the surveillance team and steering committee and to monitor the duties of pest monitor and ensuring online data entry. One pest monitor is appointed for supervising 10-14 scouts to assist them in data collection and monitoring them. He also collect data from scouts and enter it online. One Data Entry Operator per pest monitor is engaged for data entry and he communicates this data to other agriculture officers. For 8000 ha/eight villages of soybean and cotton, one scout is engaged for field visit and record observations of pest and diseases and reporting this data to pest monitor.

For Awareness and Pest based Advisory System, one senior officer of State department of Agriculture at district level acts as a coordinator to facilitate between State department of Agriculture and Steering Committee. He also nominates ten Master Trainers per district for training at SAU, he also coordinate field staff training at district level and farmers training at taluka level with help of SAU district representative. Further ten Master Trainers per district are appointed to train other field staff of State department of Agriculture. Four hundred field staff per district are appointed for obtaining training from Master Trainers. They also disseminate weekly pest advisory to the farmers. Five elite farmers per village are identified for passing this pest based advisory information to other farmers. The study was conducted with the following objectives

1. To analyze advisory services provided through CROPSAP Programme for pest incidence
2. To study outcomes of the CROPSAP Programme

METHODOLOGY

The exploratory research design was used for this study. The secondary data has been obtained from

Reports and website of NCIPM and State Department of Agriculture, Maharashtra. Accordingly data has been tabulated and presented in the results.

RESULTS AND DISCUSSION

For Pest Surveillance pest scouts were identifying major pests and diseases in the field. Pest scouts had collected pest- disease data from soybean and cotton field. In a week one pest scout had collected the data from 8 fixed villages. They had taken observations on Monday & Tuesday and Thursday & Friday for 16 fixed and 16 random plots in week. Further they had submitted the reports in the form of data sheets to agril. supervisor on Wednesday and Saturday. Same procedure had been followed for every week.

Agriculture supervisor had monitored the pest scouts on Monday and Thursday randomly through surprise checks. On Tuesday and Friday agriculture supervisor had conducted a roving survey @ 10-15 villages /day. The data entry operator had fed the compiled fix as well as roving plot reports on online website (*www.ncipm.org.in*).

The entire data had compiled online through the software automatically and reports were generated village, taluka and district wise. The data generated was interpreted by Research Associates at SAUs under the guidance of Head, Department of Entomology of each SAU. On the basis of pest situation and weather report from CRIDA Hyderabad, online taluka wise advisories were issued by universities. The capsule utilized for issuing advisories were prepared in stakeholders technical meeting.

Based on collected data on pest and diseases for creating awareness advisory services was given to farmers. The state agricultural universities issued the advisories on every Thursday and Monday. The advisory was of two types, i.e. one in detailed form to disseminate to the villages through field staff of State Agriculture Department and also popularized through radio bulletins, television, press reports, weekly bazaar, agriculture exhibitions, farmers rallies, Jingles on bus stands, village fairs, displayed on village notice board etc. Another advisory was in the form of short message, which is being disseminated through SMS to elite farmers. The advisory sent through SMS to elite farmers was discussed in the village level sittings. The agriculture supervisors and scout also created awareness among the farmers during their field visits.

Advisory based Integrated Pest Management: According to the advisory issued by concerned SAUs the required pesticides were supplied through RKVY. Rs. 12.21 crore were released which includes Pheromone traps, Bio and Chemical pesticides and plant protection appliances. This had helped the farmers for effective pest management. The farmers were made aware for adoption of IPM technologies through meetings and trainings.

Trainings given in the project :

Particulars	Trainees
Two days training for scout, monitors at SAU	862
One day training for data entry operators at at SAU	82
One day midterm training for scout, monitors at SAU	862
One day training for masters trainers and SDAO and SAU district representatives at SAU	382
District level training for field staff (400 /district)	8808
Taluka/circle level training for elite farmers	145000
Village level sittings @10/Village in 29927 villages(sittings)	239417
Exposure Visit at CICR, Nagpur for master trainers and SDAO	242
Exposure Visit at DOSR, Indore for master trainers and SDAO	354

Data entries and advisory: Anonymous (2009) E-pest surveillance system was implemented in 30 lakh hectares each of soybean-cotton and 10 lakh hectares each of pigeonpea and chickpea in Maharashtra during Kharif and Rabi seasons, respectively. Gross monetary benefit of Rs 1047.50 crores through an increased soybean production of 4.19 lakh tonnes was accrued during 2009 over the previous season.

Anonymous (2010) E pest surveillance and pest management advisories across 28 districts among seven divisions of Maharashtra was implemented during 2010 for the second consecutive season on Kharif crops viz., soybean, cotton and pigeon pea, and Rabi crop of chickpea with a total outlay of 783 lakhs. The web based surveillance methods, tracking and reporting systems have been improvised with integration of GIS based maps. An area of 26, 39.7, 13.8 and 13 lakh ha of soybean, cotton, pigeon pea and chickpea was covered representing 52.8% of the Kharif cropped area. Four, five, four and two pests in respect of soybean, cotton, pigeon pea and chickpea were monitored regularly. Pest scouts, pest monitors and data entry operators numbering 551, 64 and 64, respectively were engaged for field data collection and uploads via NCIPM's

website. While three State Agricultural Universities (SAUs) issued 5960 advisories the State Department of Agriculture disseminated the advisories through 7487351short mail services (SMSes). Above economic threshold occurrence of semilooper (> 5nos/ m row) on soybean was observed among five districts of Amravati division.

Hot spot visits of SAUs: To know the actual pest situation. SAUs had visited the spots where pest situation was critical are as below-

Name of university	Spots
Marathwada Agriculture University, Parbhani	24
Mahatma Phule Krishi Vidyapeeth, Rahuri	9
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola	13

GIS mapping system : NCIPM, New Delhi had developed taluka wise GIS mapping system for soybean, cotton, tur and gram pests. The maps generated through this system can be used for identifying epidemic area of particular pest. Weekly pest status data was used for the development of maps. Intensity wise area packets of pest can be identified through this system.

The maps of taluka for respective district can be generated for tracking epidemic area of particular crop with particular pest.

Publicity/ Awareness creation: For creating awareness among the farmers, literature (folders and posters) on insect pest management of soybean and cotton was prepared and distributed in major crop growing areas of Maharashtra. Awareness had been also created through various media viz., Audio spot and jingles on MSRCT, bus stand, T. V. channels, Radio, phone in programme, press conference, news paper, multimedia CD in Marathi language on management of soybean and cotton insect pest. The details are given below

Significant achievements : For the first time the project brought together multi-disciplinary partners comprising of agro-meteorologists, entomologists, pathologists, statisticians and computer specialists to work on surveillance systems. Based on the timely information generated in the project, SAUs issued taluka based plant protection advisories for pest-disease, for the benefit of the farmers during the project period.

The comparative data of soybean crop for year 2008 and 2009 clearly shows the impact of project. For comparison area, production, pesticide use and area above economic threshold level(ETL) have been considered. The area under soybean in 2008 and 2009 was more or less similar, but production has increased significantly in 2009 (22.20 MT) as compared to last year (18.4 MT). Similarly, area above ETL was decreased drastically to 4.8 lakh ha in 2009 from 14.64 lakh ha in 2008.

Innovative online surveillance : An innovative online surveillance (*e*-surveillance), awareness and management based project on large scale was implemented for the first time in India. With this technology farmers can know the weekly pest situation

Particulars	**Number**
Folders	100000
Posters	25000
Jingles and audio spots	
19AIR centers	Two spots, each for 30 days
38MSRTC,Bus stand	30 days
T.V.spots for 60 second on star maza and IBN Lokmat	3 spots/day for 25 days and 3 spots / days for 11 days
Special print issue on the project	1
Multimedia C.D on cotton mealy bug (State Dept)	1
Multimedia C.D on management of soybean insect pest & diseases (MAU, Parbhani)	1
Advisories dissemination	
SMS	2953479
T.V	63
Radio	83
Print	1156
Village sittings	239417 sittings in 29927 villages
Information booklet	3
Leaflets	100000

of soybean and cotton and remedy for preventing the losses. Attempts have been made to develop Standard method for surveillance of soybean and cotton pests. GIS based pest mapping technology used for the first time in India for soybean and cotton crops.

Utilization of the results after termination of the project : After termination of the project, these results can be utilized for Predication of forthcoming insect pest and diseases infestation, assessment of crop losses, locating endemic area for pest and diseases, timely and judicious use of crop protection measures, effective use of available resources-input management, identifying pest free area for export commodities, increase in knowledge and adoption level of plant protection measures in farming community and for research purpose.

Future thrust :

1 Scheme needs to be incorporated in work plan.

2 Considering the significant outcome, success of the project, it needs to implement the same project for major pests of horticultural crops.

3 Taluka based weather information like temperature (min., max.) relative humidity, wind velocity, sunshine hours is scanty. Hence, it is difficult to formulate the taluka based pest forecasting module. Moreover for development of forecasting modules three years data is required. So there is need to establish meteorological observatories at taluka level.

4 Field observations indicated that some of the pests have developed resistance against some recommended pesticides. So there is need to undertake a study on development of insecticide resistance modules.

CONCLUSION

The CROPSAP project implemented in Maharashtra for pest monitoring cum surveillance based advisory system and awareness creation through consortium mode has focused on the pest control of major crops. Advisories on Integrated Pest Management in accordance to the pest status based on pest monitoring. The project has been operationalized in as special mode with appropriate hierarchical structure. Awareness and training programmes were conducted. Innovative online surveillance along with GIS based pest mapping technology was used for the first time.

The study implies strengthening of information delivery mechanism for efficient agricultural knowledge management system. New methods and approaches for communication especially for delivery of advisory services are very essential. The study underlines the application of innovative online surveillance for control of pest incidence. Similar method need to be replicated for other crops in different regions. On the background of climate change and sudden outbreak of pests, there is a need for weather forecasting advisory services for the farmers.

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